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A new genus and species of spirostreptoid millipeds from the eastern Peruvian Andes (Diplopoda: Spirostreptida)

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ABSTRACT

Vilcastreptus hoguei is described as a new genus and species in the family Spirostreptidae, from material collected at the ruins of Machu Picchu, Peru. Several characters suggest affinity with African taxa of the family; among known American genera *Vilcastreptus* seems nearest *Conchostreptus* (Schubart, 1945) of eastern Brazil.

With the recent improvement of access, the ruins of the Inca stronghold Machu Picchu are lately being visited not only by tourists but also by biologists in various disciplines and as a result the biota of a hitherto neglected part of the Peruvian Andes is gradually being explored.

With reference to the diplopod fauna, a new genus and species in the family Chelodesmidae has already been described (Hoffman, 1986) and a second similar taxon, this one in the family Spirostreptidae, forms the basis of the present account. While a visitor at Machu Picchu in July of 1987, Dr. Charles L. Hogue obtained several specimens of a milliped apparently abundant at that locality and no doubt seen by hundreds of visitors since the animals are often abroad during the day and are large and conspicuous enough to attract even casual attention. Sent to me for identification, the specimens proved to represent both a species and genus previously unrecognized.

The spirostreptid fauna of Peru has been treated in several papers (Chamberlin, 1941; Kraus, 1955, 1960; Verhoeff, 1941), that of adjacent Brasil by Schubart (1945, 1950) and Hoffman (1988), and the entire Neotropical fauna was summarized by Krabbe (1982). Although a total of 10 nominal genera has so far been recorded for the central Andes and adjacent montane parts of Brasil, there is every reason to think that a large number remain to be discovered and defined —as indeed the novelty under consideration now attests. Although there can be no doubt that a new generic category is required for the Machu Picchu spirostrep-

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toid, our still fragmentary knowledge of its family impedes any meaningful comparisons in a search for closely related taxa.

Vilcastreptus, gen. nov.

Type species: *V. hoguei,* sp. n., from Peru.

Diagnosis: A genus of medium-sized spirostreptids (type species about 110 mm long) characterized by the normal position of the relatively short and massive telopodites on anterior side of the gonocoxae; by the 360° torsion of the telopodite well beyond the geniculum; and by the broad laminate expansion about halfway between the torsate region and apex. Prefemoral process of moderate length, straight, lanceolate in shape. Prostatic groove confined to one edge of telopodite, from torsus to apex.

Body unusually slender, L/W ratio about 6.5%. Segmental surface with profuse dense micropunctuation creating dull silky texture. Metazona with distinct secondary sulcus across dorsum, and with a single row of large uniform sigilla internally. Sterna smooth. Stigmatic grooves small and triangular. Postfemora and tibiae of legs of anterior 30 segments of male with short membranous ventral pads, with acutely projecting apices.

Mandible with 10 complete and two short pectinate lamellae, its dentate lamella with four prominent rounded lobes ("teeth"). Distal sensory spur of gnathochilarial stipes placed near base of inner palp, and not on a convexity. Mentum of gnathochilarium with short subapical transverse groove in addition to the longer subbasal groove. Prefemora of 1st legs of male with small, scarcely projecting basal lobe on oral side; coxae of these legs with small field of 6-8 setae on each side; prefemora glabrous.

Name: Dr. Hogue advises me (in litt.) that "Vilca", a common prefix on many geographical names in Cuzco Department, Peru, is a transliteration of the Kechuan word "Wilca", meaning "holy" or "sacred".

Species: So far only the type species is known.

Relationships: As already intimated in a previous paragraph, current knowledge of Neotropical spirostreptoids does not permit a very confident appraisal of the systematic position of *Vilcastreptus.* Yet a few inferences can be drawn and I venture to bring these to light for the possible benefit of anyone having occasion to work with Andean spirostreptids in the future.

Comparison of *V. hoguei* with genera already known from Peru and adjacent cordilleran countries is not very rewarding, as no close match can be found in general gonopod structure (particularly the *anterior* orientation of the telopodites) or in the presence of sigilla. The genera *Anethoporus, Cladodeptus, Epistreptus,*

Exallostreptus, Guaporeptus, Isoporostreptus, Nanostreptus, Trichogonostreptus, Orthoporus, and *Urostreptus* may all be excluded on gonopodial differences, and all except *Exallostreptus* by lacking sigilla. This particular genus differs from *Vilcastreptus* in numerous fundamental characters, however, and bears only the remotest intrafamilial affinity.

Casting the net farther afield, in a search for similar taxa, does bring in some plausible suspects, specifically in the fauna of eastern Brasil.

Interestingly enough, both of the characters specifically cited above — the placement of the telopodite and presence of sigilla — are as generally distributed among the African genera of Spirostreptidae as they are rare in American taxa. Indeed, their combined presence in individual American species is so singular as to suggest reflection of phylogenetic affinity. Sigilla occur in most African genera of this family, and again very frequently in its presumptive sister-group Harpagophoridae; since they are not present in any species of Odontopygidae nor in any known cambaloid or juloid taxon, they may be reasonably taken as synapomorphic for Spirostreptidae+Harpagophoridae, and thus as plesiomorphic within each group. It does not seem likely that sigilla evolved in the Old World tropics from ancestral forms which lacked them, as do most Neotropical Spirostreptidae, at some time before the Harpagophoridae diverged. If this premise is correct, the absence of sigilla may be taken as a derived condition. If not, it would presumably be necessary accordng to the logic of phylogenetic systematics to separate the American spirostreptids into a different family (even though such a course is not strongly indicated by other characters).

Examination of the literature has resulted in the identification of at least two species having anteriorly-placed telopodites *and* sigilla. These were originally described as *Mardonius rusticus* (Attems, 1950) and *Conchostreptus pictus* (Schubart, 1945), from the Brasilian states of Pernambuco and Mato Grosso, respectively. In 1975, I brought them together as members of a subgeneric group within *Gymnostreptus* on the basis of similar gonopod structure, but at the time did not realize their actual disjunction from most of the other taxa brought together in an unjustifiably inclusive concept of *Gymnostreptus.* In the original description of *rusticus,* Attems in fact mentioned the presence of "Eine regelmassige Reihe grosser heller Punkte" although he failed to enlarge upon what was probably the first record of that character in a New World spirostreptid. Schubart's descripttion of *pictus* did not allude to sigilla, but notes on a topotypic specimen by Krabbe (1982: 322) refer to "Sigilla auf Porenniveau in der Mitte der Metazoniten."

If *Gymnostreptus* as defined in 1975 is too heterogeneous (as I now believe) to persist as a genus, some of the species-groups I recognized may be restored to generic status. One of these will be *Conchostreptus,* to include *C. bahianus* Schubart, 1945 (the type species), *C. pictus* Schubart, 1945, *C. goyanus* Schubart, 1950, and *C. rusticus* (Attems, 1950). These four are all similar in gonopod and first male leg structure as well in distribution of pads on postfemora and tibiae and although sigilla have not been recorded for *bahianus* and *goyanus,* one suspects they will be disclosed by a close examination of material.

It is with *Conchostreptus*, then, that *Vilcastreptus* may be compared despite the substantial geographical hiatus between the respective generic ranges.

Despite evident similarities, it would be unjustified to assume that *V. hoguei* is congeneric with *C. bahianus* until the species of *Conchostreptus* can be studied for details of mouthparts and genitalia not evident in published accounts. Characters that, taken collectively, justify separate generic status for *hoguei* include: (1) greater segment number and more slender body, (2) restriction of setae to the midlength of the inner gonocoxal fold instead of to its distal fourth, (3) occurrence of distinct medial gonocoxal apophyses, (4) absence of setae from prefemora of the 1st male legs, and (5) presence of a secondary metatergal sulcus.

Attempts to locate an African genus correspondent to the two discussed above have so far been fruitless although it is reasonable to anticipate some lines of affinity between the two continents among their spirostreptid faunas.

Vilcastreptus hoguei, sp. nov.

Figures 1-10

Material: Male holotype (LACM) and male paratype (RLH) from the Machu Picchu archeological site (13.10 S, 72.35 W), Dept. Cuzco, Peru; C. L. Hogue leg. 2 July 1987.

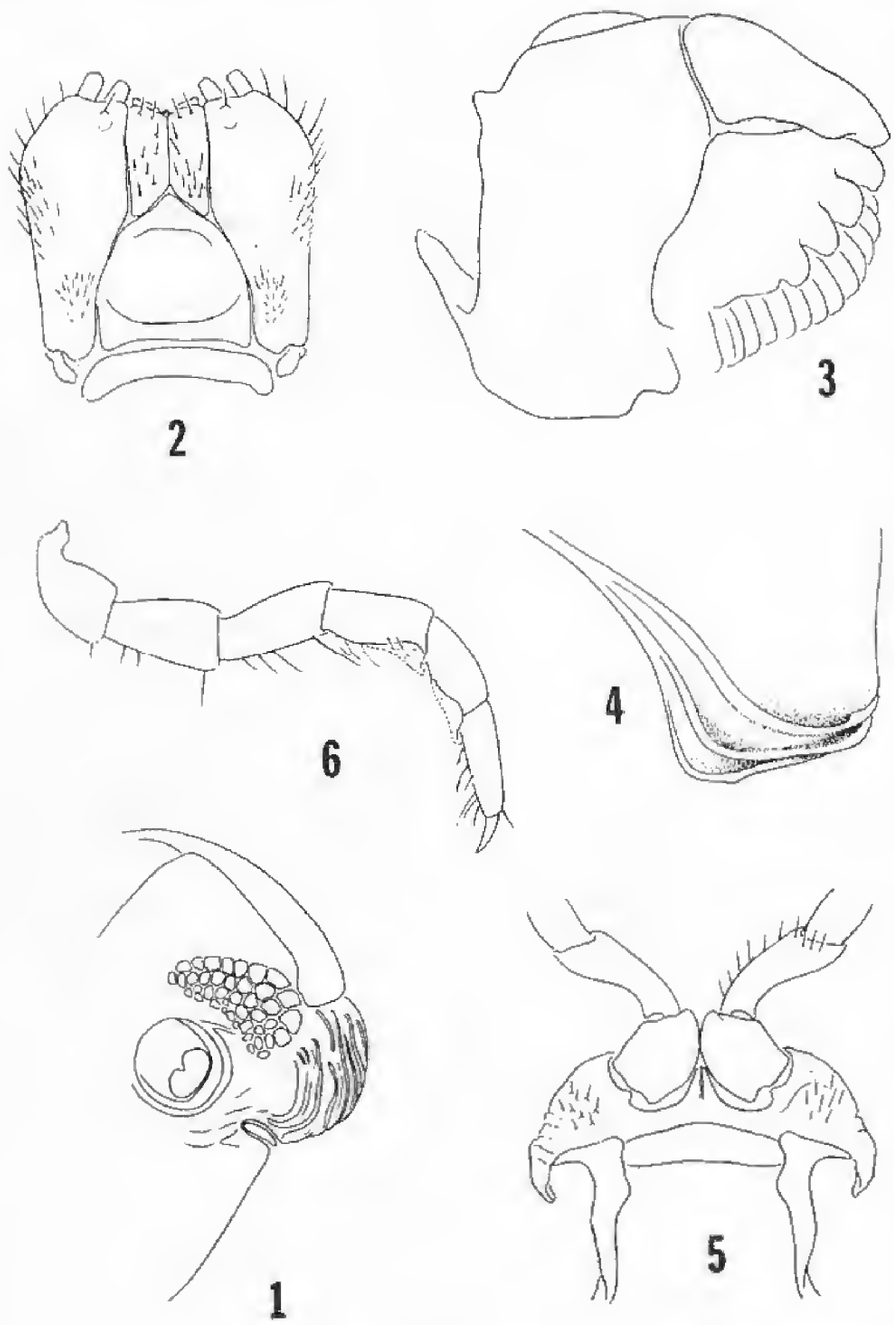
Diagnosis; With the characters of the genus. Further specific characters will be identified in gonopod structure when additional species are found.

Name: For the collector, curator of Entomology at the Natural History Museum of Los Angeles County.

Holotype: Adult male with 61 body segments, length approximately 110 mm (specimen broken and tightly coiled), maximum diameter, 7.1 mm, the body therefore unusually slender with a W/L ratio of about 6.5%. Color of preserved specimen superfically dark brown with legs and antennae yellowish-brown; under low magnification segments appear piceous to black with exposed parts of prozona lighter, legs and antennae clear orange, margins of paraprocts and anterior edge of collum somewhat darker orange; lower face of face light brown.

Head unmodified, face moderately convex, 5.5 mm in maximum width; surface smooth and polished except for postantennal temporal lobe which is strongly ridged (Fig. 1); antennal isthmus broad (2.5 mm); interocular space a little narrower (2.3 mm) but still greater than length of an ocellarium, the latter subreniform and relatively small (length ca. 1.8 mm), about 72% of interocular distance. Ocelli flat, rounded to hexagonal, in seven rows (Fig. 1) with a total of 42 ocelli, largest laterally. Antennal socket with broadened rim ventrally and posteriorly, at the front of an evident postantennal depression. Antennae moderately long (8.8 mm), of typical spirostreptid form, the second article longest, antennomeres 2-5 much shorter and strongly clavate, 6th suboval in form, narrower than 5th and slightly compressed; 7th very short, with four sensory cones; articles 5 and 6 with large oval sensory pit on outer distal margin.

Mandible with ten pectinate lamellae of full width plus two shorter proximal series, the individual units of the pectines simple and spatulate without dentations of notches; dentate lamella with four prominent, well-defined teeth (Fig. 3). Gnathochilarium (Fig. 2) of typical spirostreptoid form, except that distal sensory spur of stipites not placed on a convexity, located closer to inner stipital palp than usual



Figs. 1-6. *Vilcastreptus hoguei.* 1. Left side of cranium, antenna removed, to show details of ocellarium and temporal lobe. 2. Gnathochilarium. 3. Distal segment of mandible, enlarged. 4. Lateral end of left side of collum. 5. Sternum and basal podomeres of first pair of legs, oral aspect. 6. Leg of segment anterior to midbody, ventral pads stippled.

in the family. Mentum with a deep transverse basal groove and a shallower but still distinct distal groove. Setal distribution as illustrated. Prebasal plate smaller than usual and slightly lower than level of mentum base but otherwise unmodified.

Lateral end of collum (Fig. 4) subtruncate, the anterior corner only slightly lobed anteriad; two major oblique sulci attain posterior edge and a much smaller marginal sulcus sets off anterior corner, surface otherwise unmodified.

Segmental texture unusual: anterior two-thirds of prozona with about 10-12 poorly-defined, frequently anastomosing concentric striae, becoming larger and acute ventrad, the posteriormost distinctly the largest; posterior two-thirds of prozona and entire surface of metazona very closely and densely scored with minute elongate punctures and striae, producing a notably sericeous effect when seen at low magnification; primary segmental sulcus marked by a sharp elevation of prozonal surface — nearly a low ridge; a less well-defined but still evident secondary sulcus crosses metazona at about their midlength, just behind level of ozopores. Metazona below level of pores with up to 12 complete fine striae, becoming larger ventrad, extending back from their origin on the sulcal ridge. Ozopores minute, elongate-ovoid in shape, and set in a slightly oblique angle on the smooth peritrematic area. Metazona with a single row of circular sigilla of nearly equal size centered on the darkly pigmented internal surface (Fig. 7), typically about 100 sigilla in the entire series; spacing varies slightly and occasional small spots occur.

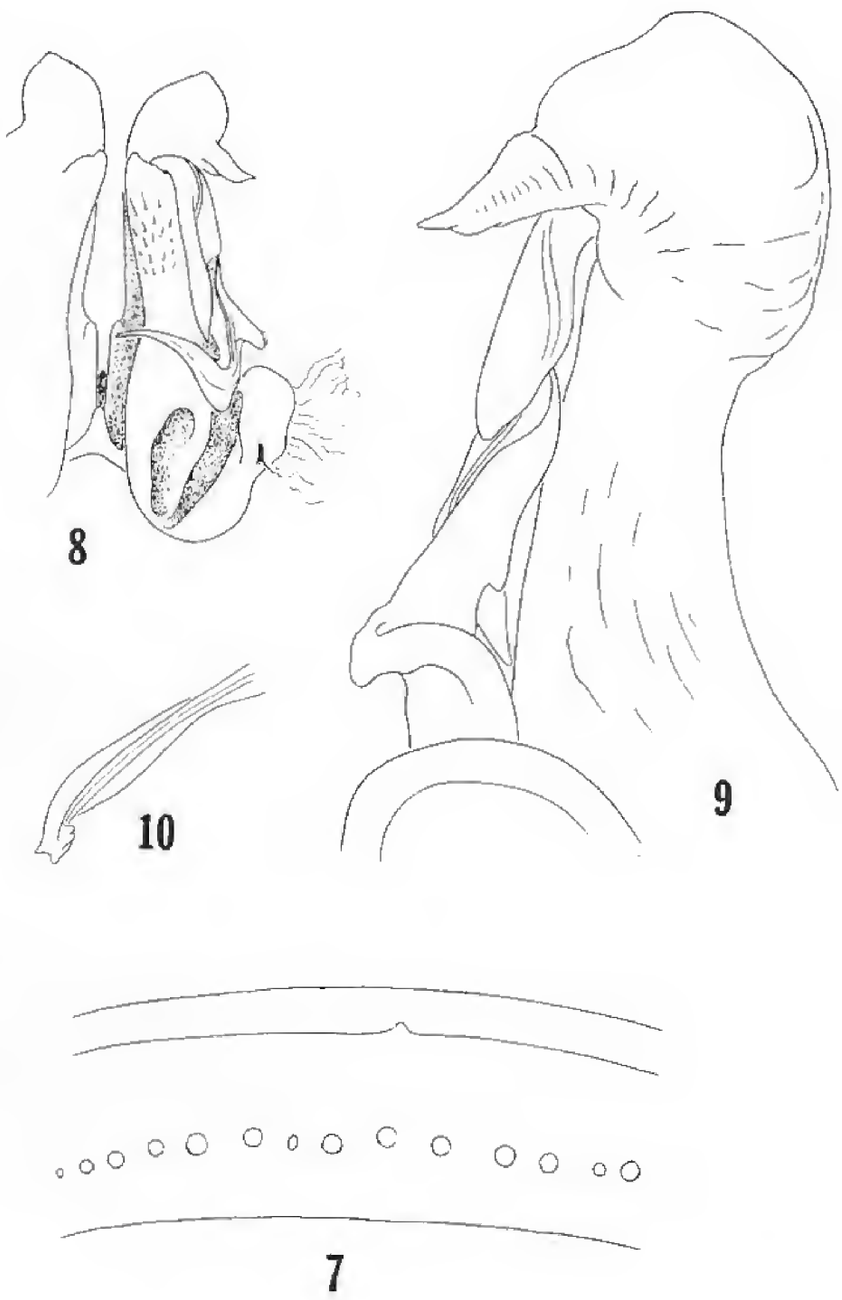
Sterna completely smooth; stigmata small, ellipsoidally-oval, those of anterior sternum of each segment with adjacent small triangular depressions at end of pleurotergum. Legs long (about 7.5 mm at midbody), slightly more than diameter of the corresponding segments, their shape and setation as shown in Fig. 6. Postfemora and tibiae with membranous pads, occupying about distal half of ventral surface on anterior legs but becoming smaller posteriad and missing completely from legs posterior to 30th segment.

Last body segment short, with very small median dorsal epiproct; paraprocts large, with same texture as metazona, posterior rims large and prominent but not set off by basal grooves; hypoproct broadly triangular with promient median projection, basally fused with preceeding segment.

Legs of first pair (Fig. 5) scarcely modified from the usual spirostreptoid form. Tracheal apodemes long, distinctly set off proximally; lateral surface of coxae with six to eight setae each side; median sternal element conspicuous; prefemora with only small, broadly triangular, basal projection, surface of these podomeres glabrous.

Gonopods singular in form: paracoxites set off by prominent deep groove; base of inner coxal fold with elongate reniform depression, median coxal apophysis small, continuous with inner surface, anterior side of inner fold with subapical field of small indistinct setae. Posterior coxal fold with slight terminal expansion and moderate "lateral cone". Telopodites carried on anterior side of coxae (Fig. 8), only moderately long, broadly expanded distad to torsus and subsigmoidally fixed, with a large lateral lobe. Prefemoral process straight, lanceolate; telopodite

torsate 360° (Fig. 9) well distad to the geniculum. Prostatic groove visible for most of its length proceeding from the torsate region strictly along one edge of the telopodite out to the tip, latter, with higher magnification, with very thin marginal flanges and a terminal lobe (Fig. 10).



Figs. 7-10. Vilcastreptus hoguei. 7. Inside of metazonum of midbody segment, middorsal region, showing sigilla. Lower line anterior, upper posterior. 8. Right gonopod, anterior aspect. 9. Round gonopod, posterior aspect, enlarged. 10. Apex of telopodite, enlarged. All drawings from holotype.

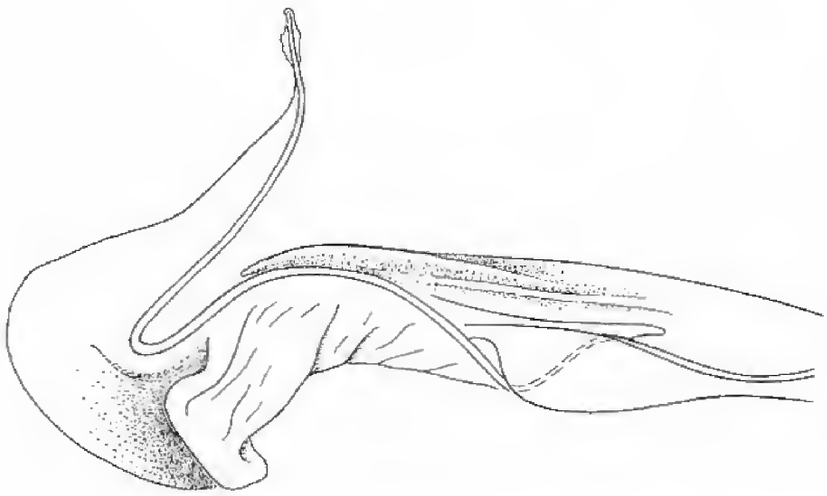


Fig. 11. Vilcastreptus hoguei. Distal half of telopodite of right gonopod, anterolateral aspect.

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